UNITED STATES ARMY
SPACE AND MISSILE
DEFENSE COMMAND

Space Server Concept

Summary

- Provides satellite location for a wargame
- Allows for the integration of a variety of satellite propagation models
- Allows for the future integration of sensor, communication, and other space-based component modules
- Provides a single entry point to connect space-based component representation within the context of the distributed simulation environment

Provides space-based asset representation in distributed simulation to improve Space Modeling of Intelligence Surveillance and Reconnaissance (ISR) and communication.

The Space Server provides improved simulation functionality, enabling a more accurate representation of Army and Joint space-based assets. The Space Server utilizes existing propagation models to provide a real-time representation of satellite constellations in the context of a distributed simulation environment. The Space Server is fully configurable, allowing the user to specify the initial configuration and orbital characteristics of the satellite constellation. Detailed satellite state and platform status information is provided to the distributed network for use by subscribing simulations. The Space Server was developed using a modular approach that will support the future integration of space-based sensor and communication payload models.

Space Server Concept

The space server provides a capability to represent existing and future space-related technologies in the context of a distributed simulation environment. It provides a high-fidelity representation of satellite constellation state information, thereby allowing subscribing simulations the capability to more accurately model space-based payloads. In addition to satellite state, the Space Server currently performs line-of-sight (LOS) calculations, notifying subscribers when a particular satellite is in range of a specific area-of-interest (AOI) and provides satellite platform status.

There are three major components to the functional space server system:

- **Space Server Core Module**
  This module serves as the centralized controller of the Space Server system. It is responsible for communicating with all other server modules including the Graphical User Interface. Functionality includes simulation time management, LOS calculation, and constellation configuration. All Space modules utilize the Joint Modeling and Simulation System (JMASS) to achieve interprocess communication.

- **Propagation Module**
  This module provides the exclusive interface to the satellite propagation module. Current propagators utilized include the Satellite and Missile Analysis Tool (SMAT) and Space Common Operating Picture and Exploitation System (SCOPES).

- **Distributed Simulation Module**
  This module provides the interface with the distributed simulation environment. Functionality also includes coordinate system transformation. Currently, this module utilizes the Distributed Interactive Simulation (DIS) protocol to interact with the external simulation network. Plans are underway to implement a High Level Architecture (HLA) interface.

The Space Server capabilities include:

- remote configuration of a satellite constellation,

- publishing of satellite state and platform status data,

- publishing of interactions indicating when a requested area of interest is within the field of regard of a constellation.

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